



DER Planning Framework: SMUD iDER

BUILDING A WORLD OF DIFFERENCE®



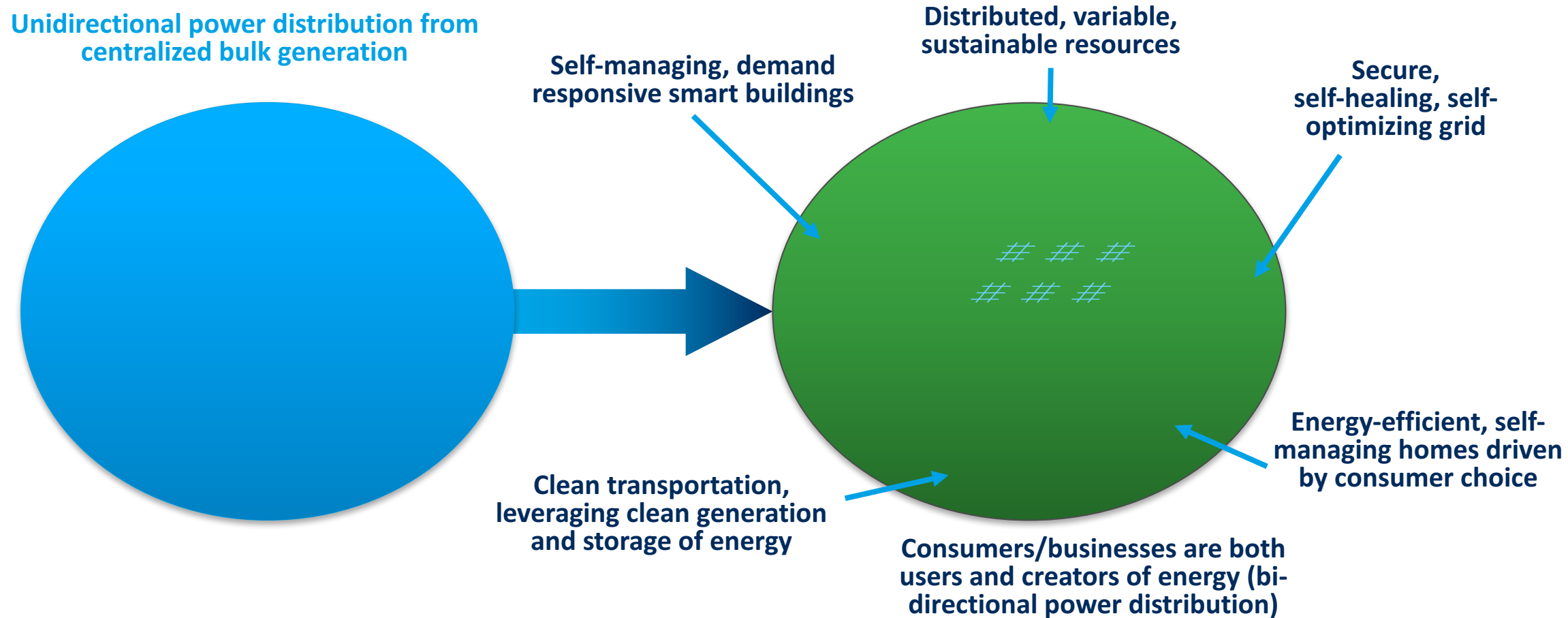
BLACK & VEATCH

19 September, 2017

Karlynn Cory

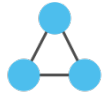
Manager – Consulting,
Renewable Energy

Thinking about the “Future” for Electric Utilities



Black & Veatch Approach to Distributed Resource Planning

DRP Framework



- Benchmarking of DRP in other states
- DRP strategic objectives
- Overall DRP process design and alignment
- Gap analysis of existing DER processes
- Stakeholder workshops
- Regulatory filing support

Distribution Planning



- Hosting capacity and future scenario analysis
- Customer DER potential & adoption forecasting
- T&D upgrade deferral opportunities with DERs

Benefit/Cost Analysis



- Methodology for locational costs/benefits
- Analysis of locational costs/benefits

Grid Investment



- Business case for DER technology investments (hardware and software)

Tariffs/Contracts/Programs



- Align existing/new DER programs with DRP objectives
- (Re)Design of DER tariffs/rates

Implementation/Demonstrations



- Design of pilot program for grid benefits
- EPC of integrated DER pilot project
- Mitigation strategies for DER grid impacts
- Procurement process & contract development for grid services from DERs
- RFP & vendor selection support for DER-related technologies
- Customer engagement plan

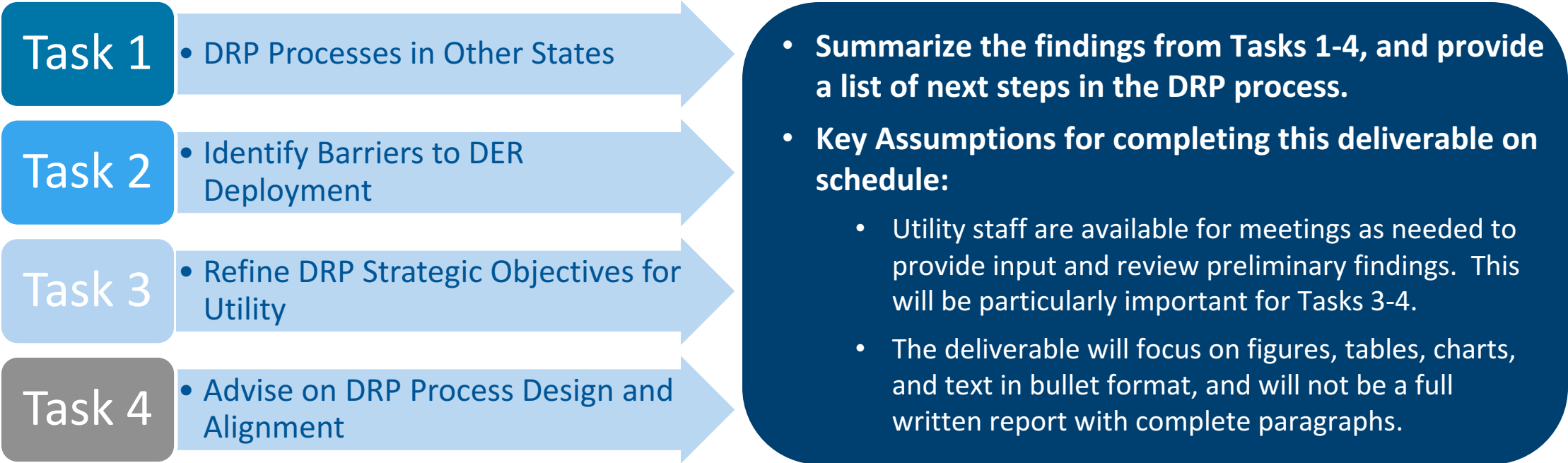
Other Services

- Identify/discuss DER growth barriers
- Implementation of IT/OT platforms for DER, and AMI data analytics
- Maps of hosting capacity, locational value
- Stakeholder workshops on data sharing



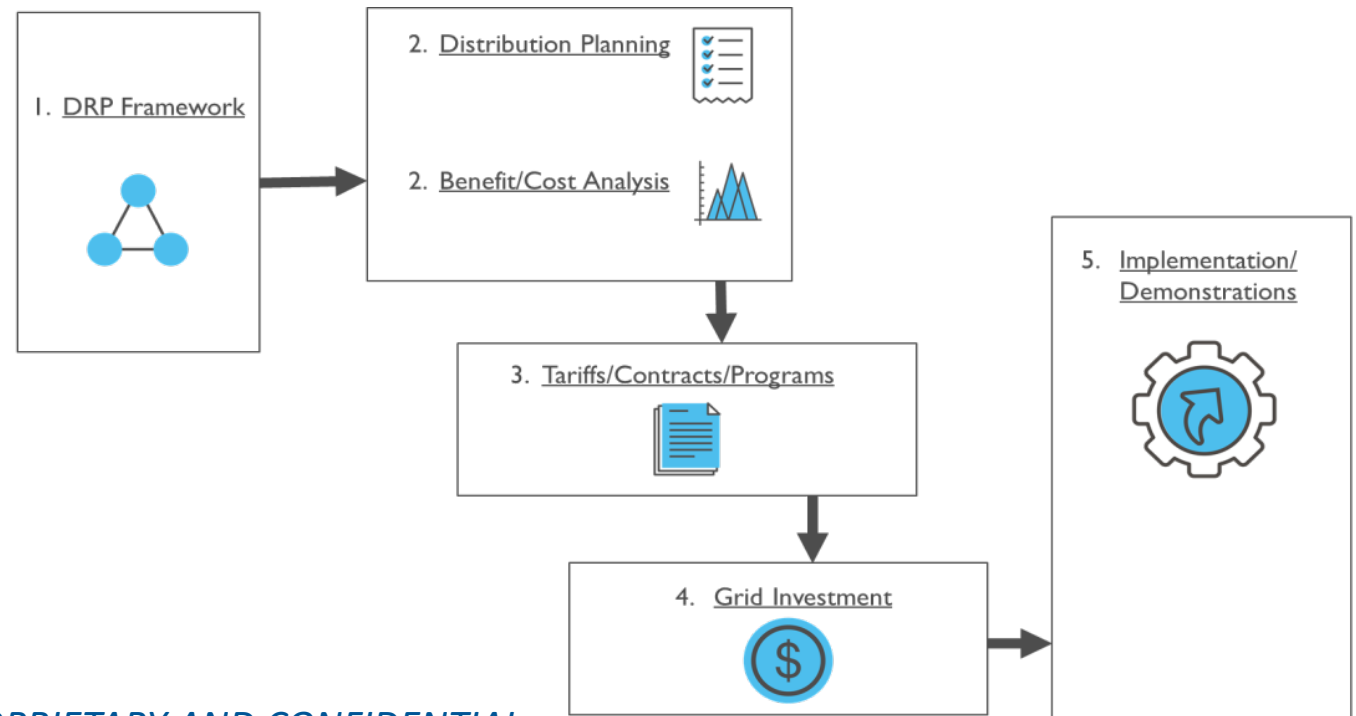
One Approach to Developing a DRP framework

Black & Veatch generally uses the following tasks to support utility clients in developing the DRP Framework, leveraging our team’s unique combination of expertise:



DRP Process Design and Alignment

1. Document a proposed DRP process
2. Align DRP with existing planning and regulatory processes in the future



Black & Veatch and SEPA Series: Planning the Distributed Energy Future

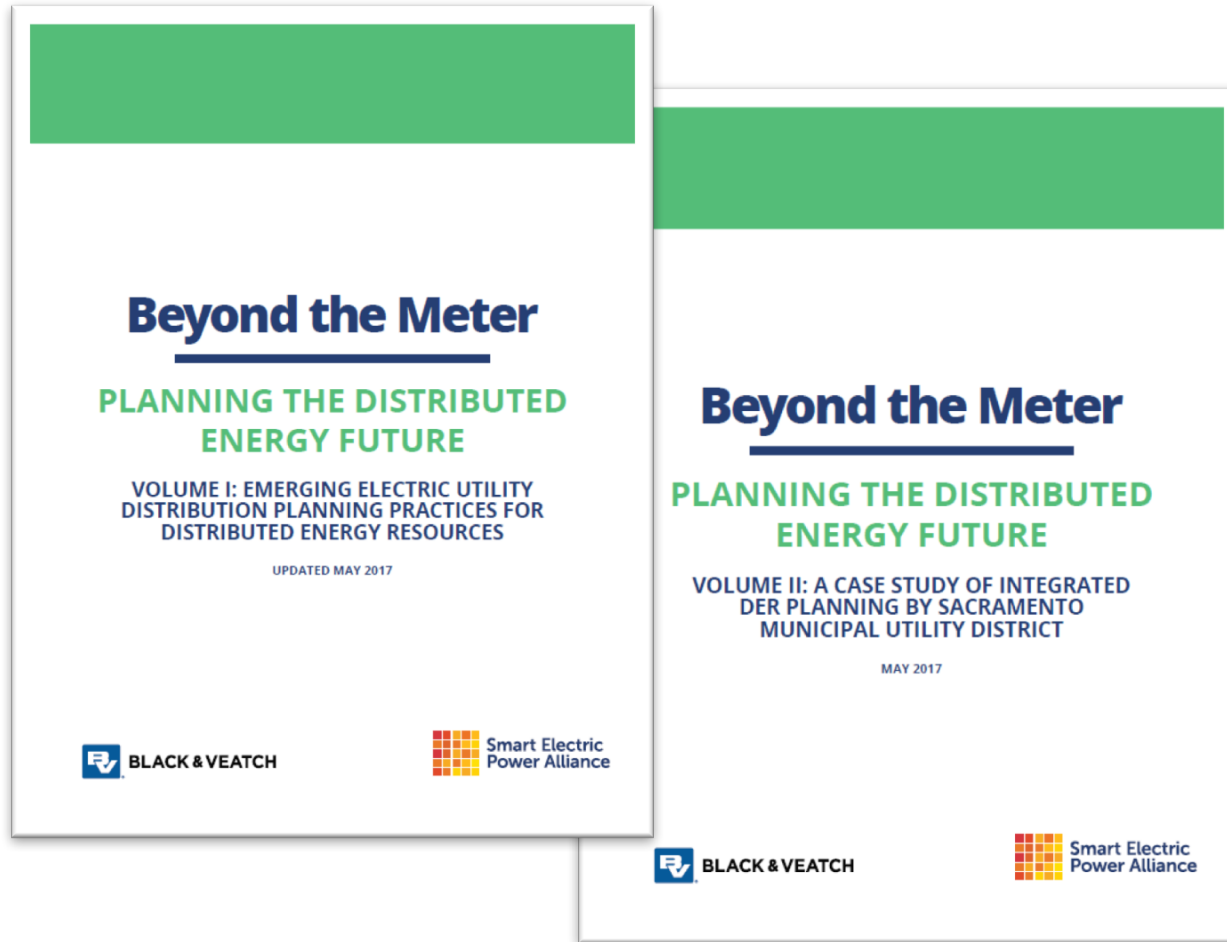
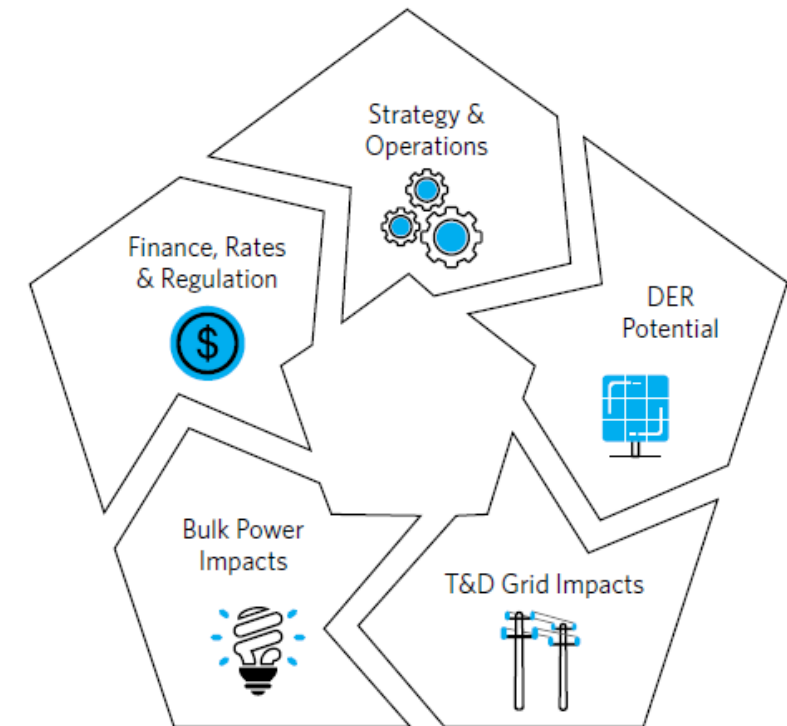


ILLUSTRATION OF A COMPLETE, PROACTIVE DER PLANNING PROCESS

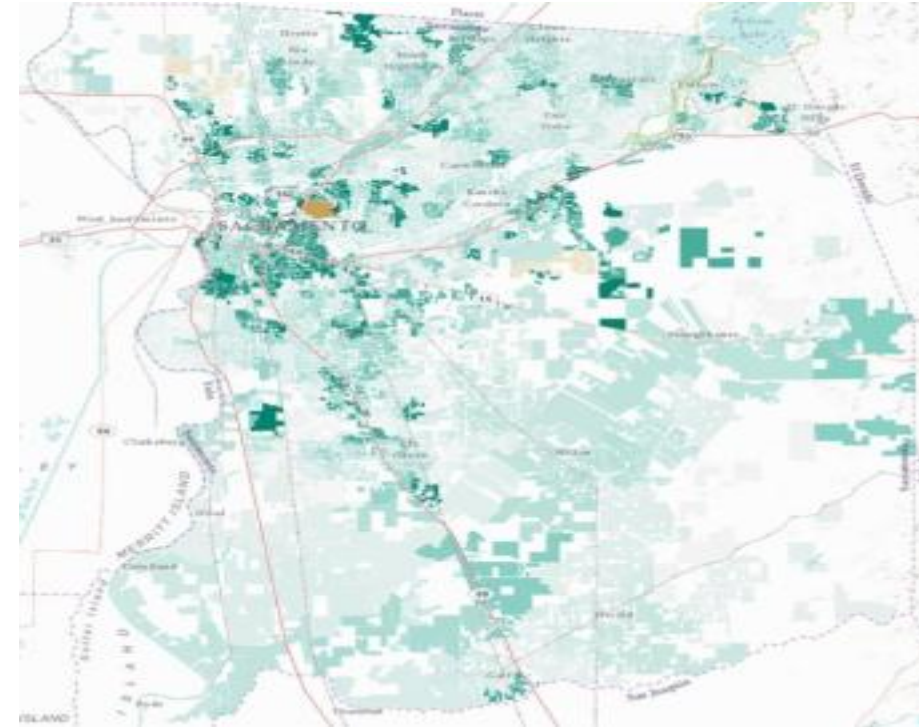


<https://sepapower.org/resource/beyond-the-meter-planning-the-distributed-energy-future-volume-i/>
<https://sepapower.org/resource/beyond-meter-planning-distributed-energy-future-volume-ii/>



SMUD iDER Planning: Project Background

- SMUD engaged Black & Veatch to assist in assessing integrated Distributed Energy Resources (iDER)
- Major tasks
 - a) Review of existing work and processes; tie together approaches
 - b) Rooftop PV potential modeling
 - c) New, detailed assessments of potential through dispersion modeling (customer DER potential and adoption forecast)
 - d) Distribution system impact modeling (GRIDiant)
 - e) Bulk system impact modeling (PLEXOS)
 - f) Economic valuation (net value of each DER, and combined)
- First of a kind study



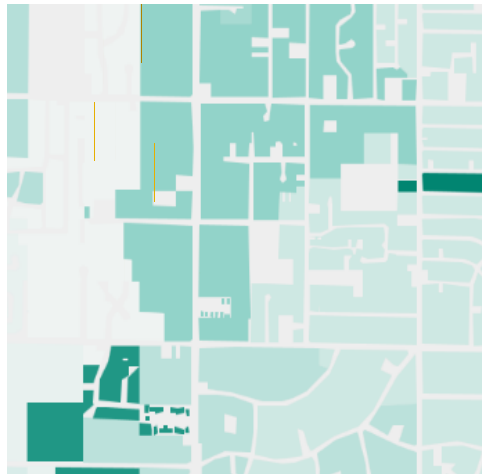
Projected DER Load Impacts




CONSIDER DER IMPACTS FROM MULTIPLE ANGLES

DER Potential By Circuit

- Summary-level information
- Total change in load (MWh) on a circuit due to DER (+ or -)
- All parcels served by circuit shaded same

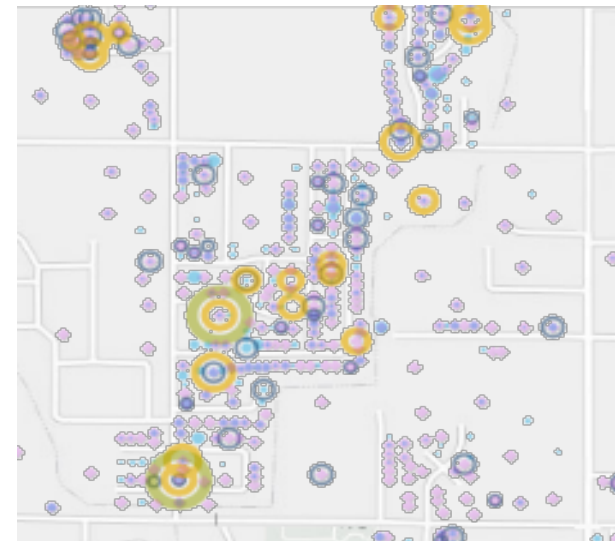


Change in Load (GWh/yr)

-5  +5

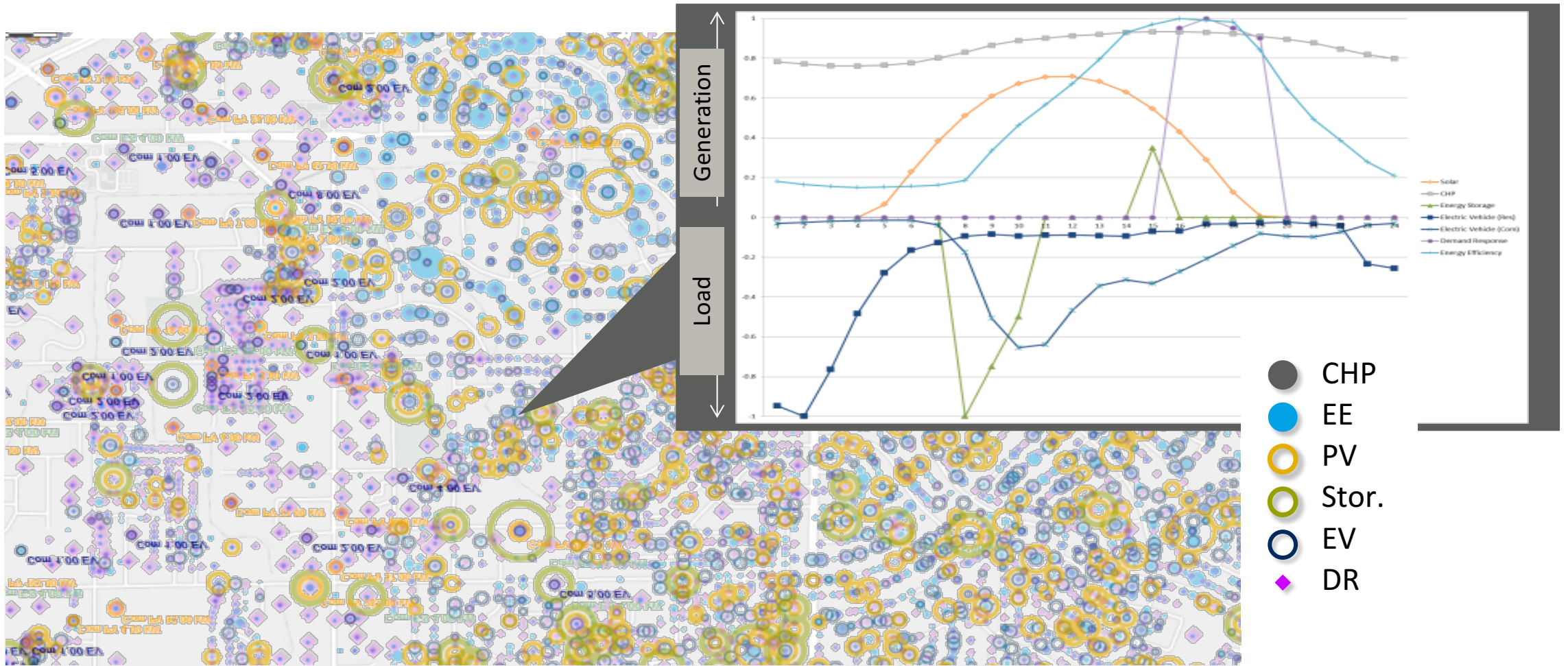
Individual Customer DER Adoption

- Customer-level information
- Different symbol and color for each DER. Size proportional to DER output.
- Concentric circles for multi-DER



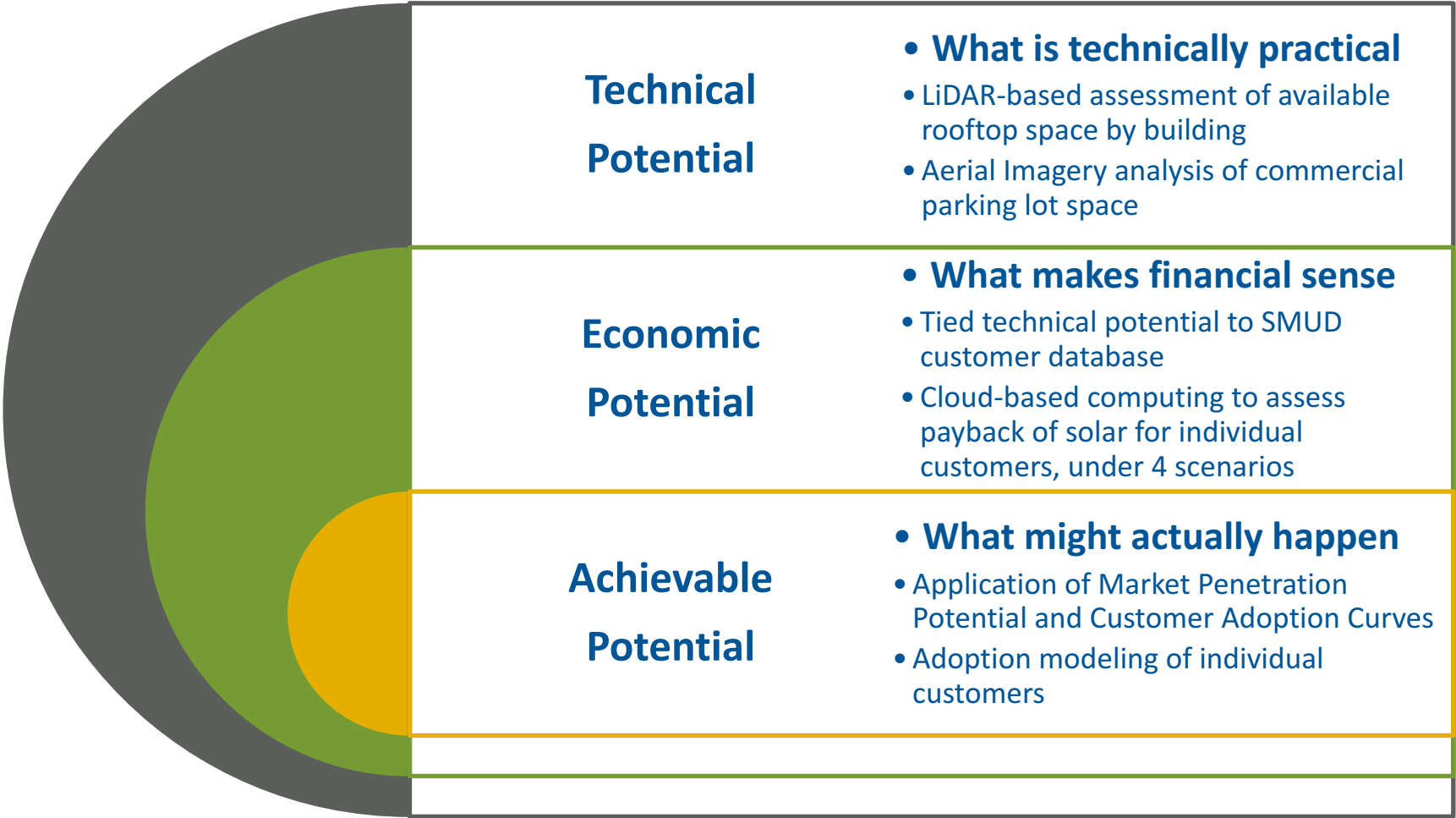
● CHP
● EE
● PV
● Stor.
● EV
◆ DR

ALL RESIDENTIAL DER ALL COMMERCIAL DER

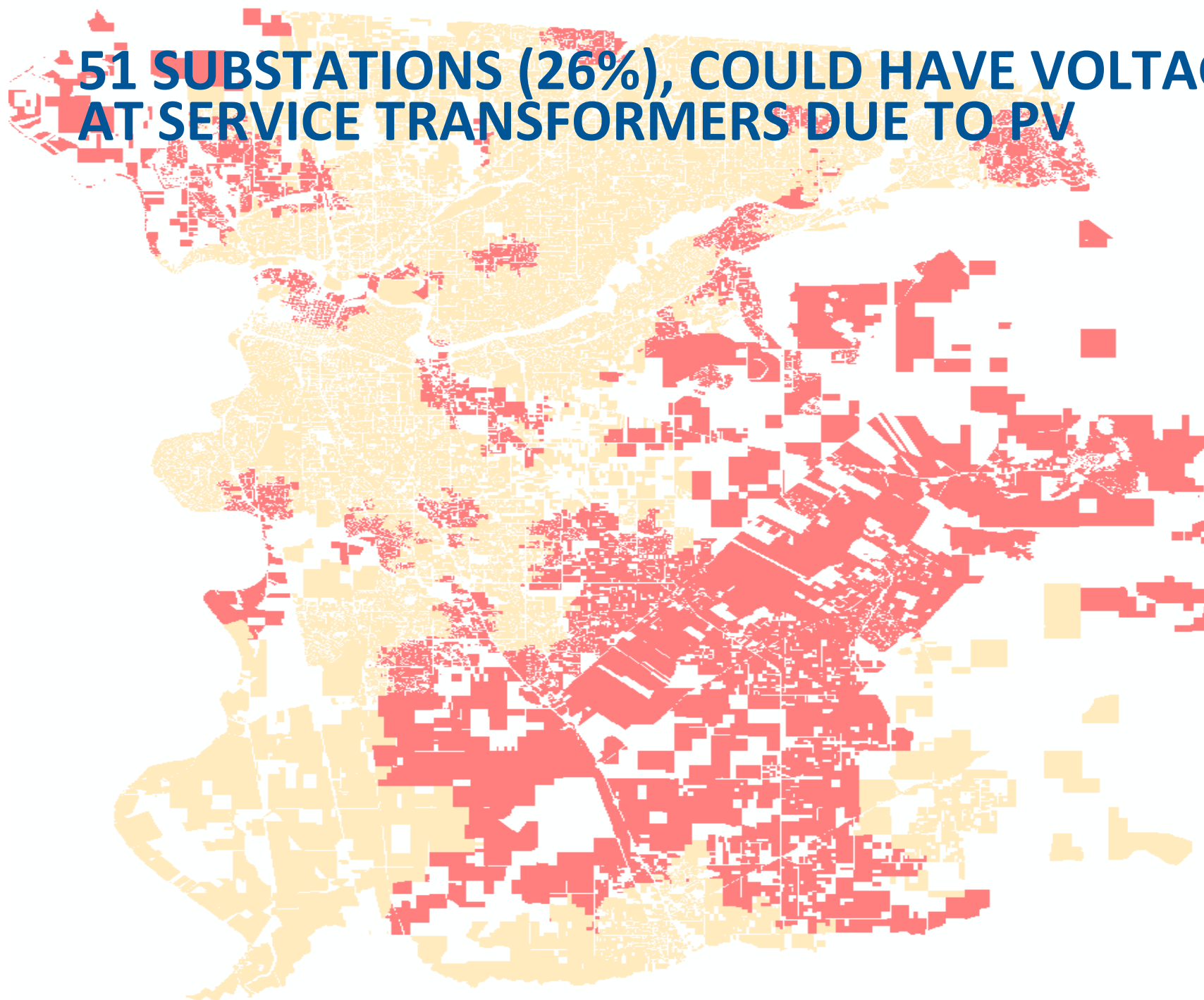




DG SOLAR PV POTENTIAL APPROACH



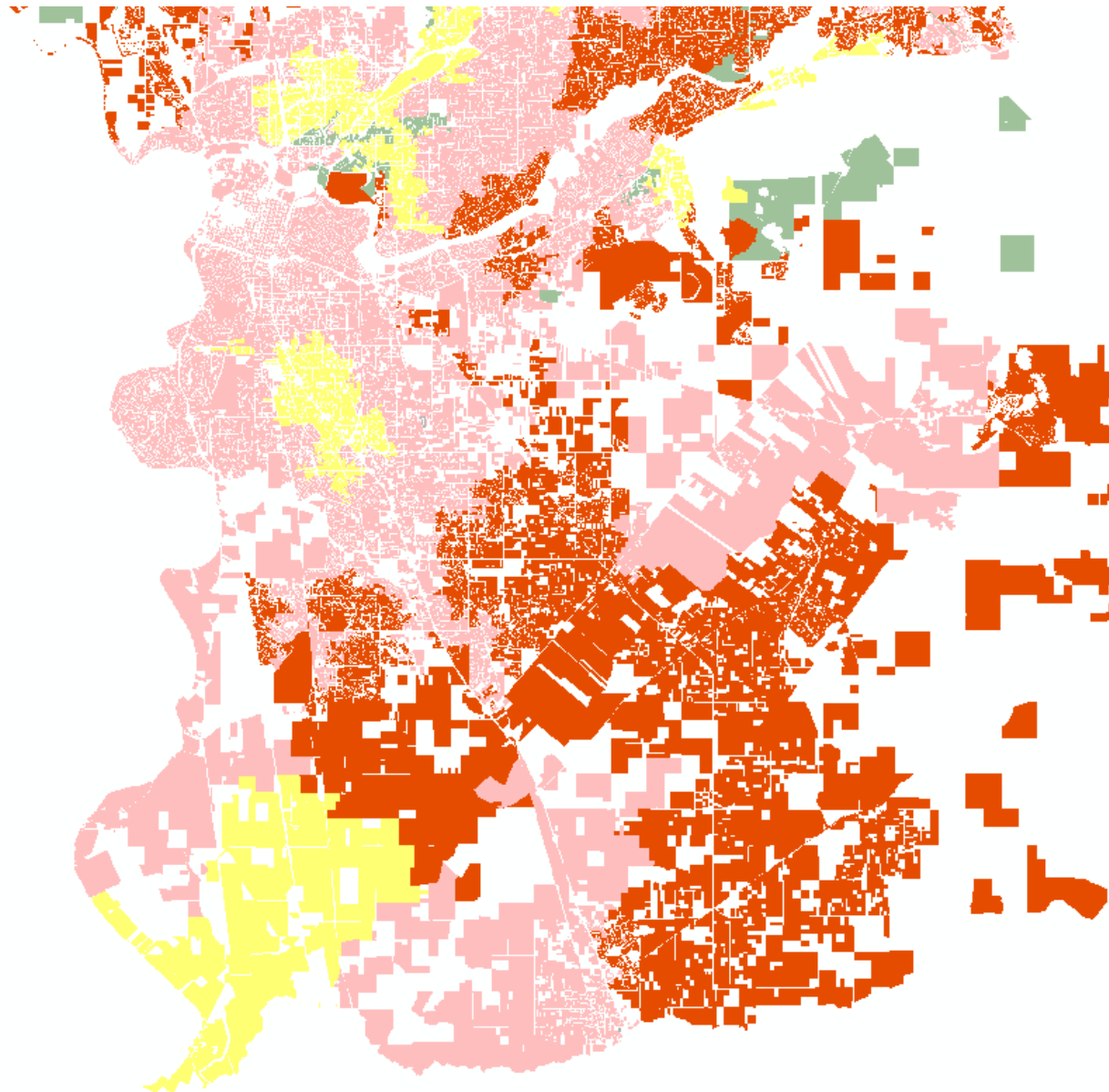
51 SUBSTATIONS (26%), COULD HAVE VOLTAGE VIOLATIONS AT SERVICE TRANSFORMERS DUE TO PV



- Over- or under-voltage violations, July 2030
- Voltages within limits



OVER 12,000 TRANSFORMERS MAY NEED TO BE UPGRADED DUE TO EVS, 17% OF TOTAL



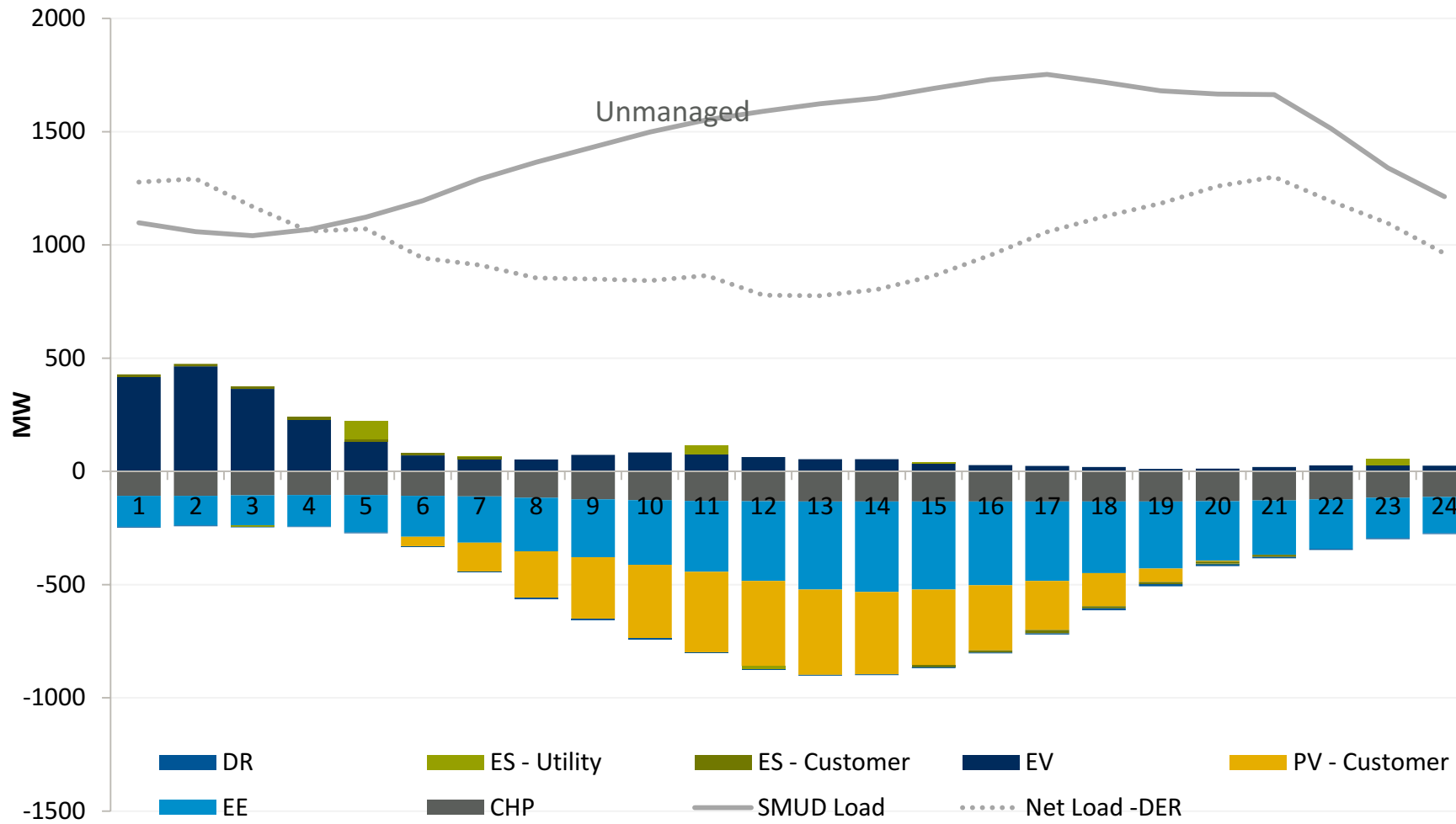
PERCENT OF
TRANSFORMERS
STRESSED DUE
TO EVS

- under 5%
- 5% to 10%
- 10% to 20%
- over 20%

REPRESENTS A
HIGH EV,
UNOPTIMIZED
CHARGING
SCENARIO



MAXIMUM DER PENETRATION (52%) – JUNE 25, 2030



The combined DER portfolio was found to decrease ramping requirements and to actually flatten SMUD's net load profile.

Preparing for the Inevitable Arrival of DERs

- Different drivers will push different technology mixes
 - What are your goals? How do they meld with other stakeholders' goals?
 - What are the main drivers that will help you meet your goals? Others' goals?
- Most utilities are concerned about DERs
 - But they don't have the tools to be flexible, nimble, and responsive
 - Slow to change planning activities to be prepared, instead of reactive
- SMUD is asking forward-looking questions to be ready for the predicted onslaught of DERs
 - "But we don't have SMUD's level of penetration, do we need to act now?" **YES**
 - Identify activities that can be done now, to be prepared (e.g., least regrets)

All Hands on Deck

1. Critical pathway: DATA

- More detailed data needs to be gathered (e.g., net load is inadequate)
- We are finding data for the same location can be inconsistent and not in the same format – data validation and data formatting is a heavy, and necessary lift

2. Planning and Operations Analysis: New Insights

- Link DRP and bulk system/integrated resource planning (IRP)
- Understand the impact on the utility system and economics
- Don't try to analyze all of the data: focus on key issues in problem locations

3. Identify win-win-win pathways forward

- Key stakeholders need to be on board from the start; roadblocks could mean
- Requires investments in analytics, modeling tools, communications systems and IT infrastructure. (DOE to fund? Utilities having trouble getting capital internally)

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